FAA GENERAL AVIATION NEWS

JUNE 1978

A **DOT** / FAA FLIGHT STANDARDS SAFETY PUBLICATION

Sink or Climb?

FAA GENERAL AVIATION NEWS

DEPARTMENT OF TRANSPORTATION/FEDERAL AVIATION ADMINISTRATION VOL. 17, NO. 2

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FAA GENERAL AVIATION NEWS is published by Flight Standards Service, Federal Aviation Administration, Department of Transportation, Washington, D.C. 20591, in the interest of flight safety. The magazine is designed to promote safety in the air by calling the attention of general aviation airmen to current technical, regulatory and procedural matters affecting the safe operation of aircraft. Use of funds for printing FAA GENERAL AVIATION NEWS was approved by the Office of Management and Budget through August 31, 1980. All printed materials contained herein are advisory or informational in nature and should not be construed as having regulatory effect. The FAA does not officially endorse any goods, services, materials or products of manufacturers that may be mentioned. Certain details of accidents described herein are altered to protect the privacy of those involved.

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Don't Give up the Ship

A new series on pilots who dealt successfully with unusual inflight problems

Mechanical failures, infrequently as they occur in modern aircraft, have led to many accidents and much loss of life which could have been avoided if the pilot had not succumbed to a sense of panic when he first realized that something was radically wrong with the airplane. His fears are easily magnified when he has no clear understanding of what has gone wrong—why the airplane is not responding to the controls normally, or why the instrument reading is contrary to all expectations. Without means of escape via parachute (unless he is a military or aerobatic pilot) and with little in the way of redundancy or backup systems to come to his aid (unless he is flying a very sophisticated aircraft) he can easily come to feel helpless and trapped in the cockpit. In these circumstances pilots have been known to "lose their cool" and either resort to frantic efforts to regain control by pushing and pulling on various controls, or freeze on the wheel in a desperate hope of being saved by some miraculous change of fortune.

But there is a backup system present in even the smallest aircraft ever built which, when functioning properly, is superior to the most complicated, automated, computerized system ever invented: *the human mind.*

The history of flight abounds with remarkable stories about pilots who have landed safely in aircraft that were almost in shreds, with the engine torn out, or with scarcely any retention of normal controls. The difference between these pilots and their unfortunate brethren who were unable to prevent a crash landing is not always a matter of skill and experience but often comes down to an attitude of mind which is expressed in the title of this series: "Don't Give Up the Ship!

Almost without exception the pilots who have come through this type of experience safely have exuded a philosophy of confidence in their aircraft and in themselves. In the presence of this kind of resolution, or unflappability, the mind appears to reorganize itself automatically and address itself to the unusual situation with ingenuity and make-do, instead of wildly searching for causal answers. Personal accounts of such adventures typically express a determination to continue flying the airplane as long as there was anything left to fly . . . "I made up my mind to fly it right down into the grass, no matter what fell off, as long as there was a seat to fly from, and if that fell off I'd fly that instead."

No one can tell you what to do in an unpredictable emergency because the circumstances are never exactly the same. But perhaps reading about how other pilots handled apparently insoluble problems aloft will help build the positive mental attitude which is a key to survival.

Not once but twice in his 32-year career as a pilot has Jan Shaffer of Berea, Ohio, found himself in command of an aircraft which, for reasons beyond his control, was seemingly unable to fly. Jan is a 19,900 hour airman who started out to be a teacher, graduating from Bowling Green State University with a B.S. in education. But after getting his private pilot's certificate as a freshman he went on to get an instructor's rating, multi-engine, land and sea, rating, and an ATR. After several years of teaching flight and ground school courses, he moved into aviation full time, flying for commuter airlines and private corporations. On August 31, 1966, when the first incident occurred, he was chief pilot for an engineering firm based in Cleveland, flying a Beech Super 18.

Learjet cockpit at night, with cabin vertical speed and pressure differential indicators barely visible below copilot's control wheel.

The flight departed Cleveland in midafternoon for a short VFR hop to Culver, Ind., on a day that was bright with sunshine, although visibility was restricted by the prevalent industrial haze. Jan selected a cruise altitude of 8,500 feet, where he estimated visibility to be ten miles, to keep above the worst of the haze. His passengers included the owner of the firm, Lee Wilson, his wife and a friend. They were about 75 miles into the trip, approximately five miles ESE of Fremont, Ohio, when the pilot's ears were assailed by the violent sound of metal ripping.

Jan's first thought was that there had been an explosion on board. The top of the fuselage over the cabin was torn open, exposing blue sky through a six foot gash. The Beech rolled over into a left spiral descent that threatened to become a spin. There was no response to the rudder or the elevators. The startled pilot did not yet know they had suffered a midair collision with another aircraft, resulting in extensive damage to the tail section and fuselage.

There was no time to wonder why or how; the spin had to be prevented. Jan pushed the left engine throttle forward to full power and eased back on power for the right engine. To counter the fierce vibrations set up by the external damage he had to lock his left arm around the control yoke. To gain directional stability he extended the landing gear. On his own initiative Lee Wilson was able to reach up and push some of the torn and bent metal of the upper fuselage together, to reduce the inrush of air, which was adding to their control difficulties. At 4,000 feet the pilot got the Beech fairly straight and level.

Still clutching the yoke with his left arm, he made an emergency call to Cleveland Air Traffic Control Center, told them he had a broken fuselage, and was going to try a straight-in approach to Fremont. The Center cleared traffic away from his descent to the small non-controlled airport.

Maintaining an extremely gentle glide without flaps (he was afraid extending flaps might disturb the tenuously stable airflow over his damaged plane), Jan nursed the Beech ahead until the airport came in sight. The runway was only 3,200 feet long, but it looked beautiful to the pilot who eased the crippled plane down, bringing it to a stop at the extreme end of the pavement. Incredibly, none of his passengers had been hurt, and were not even badly frightened. Jan announced that there would be a change of aircraft, rented them another plane and sent them on their way.

(The *Apache* which had struck the Beech was bellied into a cornfield with everyone safe. The pilot did not know until later—when foreign paint was found on his aircraft—why one engine stopped and the other began vibrating, but he did know he had to get on the ground, without delay.)

Interviewed by newspapermen about his remarkable survival, Jan simply chalked it up to experience—and luck. "There is always something you can try, and you hope for the best." Later he had the pleasure of hearing Charles Lindbergh describe him as the "world's best pilot," in token of his feat, which the Lone Eagle, who had his share of brushes with disaster, evidently considered an extraordinary display of resourcefulness.

Jan Shaffer continued his aviation career uneventfully for the next 11 years, assuming that he had seen his share of the unusual. He got his jet rating and began flying with an air taxi service out of Detroit. One evening in November he was scheduled to fly a cargo of high priority automotive parts to San Jose, Cal., in a Learjet 23. With a co-pilot beside him, Jan took off from Detroit Metropolitan shortly after midnight. They planned to refuel at Pueblo, Col. The night was dark but the air was clear and cloudless, and it looked like just another humdrum routine flight, until something on the instrument panel began to puzzle him . . .

"My flight plan was filed for 41,000 feet, flight level 410 on the form. The preflight preparation was done correctly with all the items on the check list completed without exception. I always double-checked these things before takeoff with a memorized, systematic key-word type checklist.

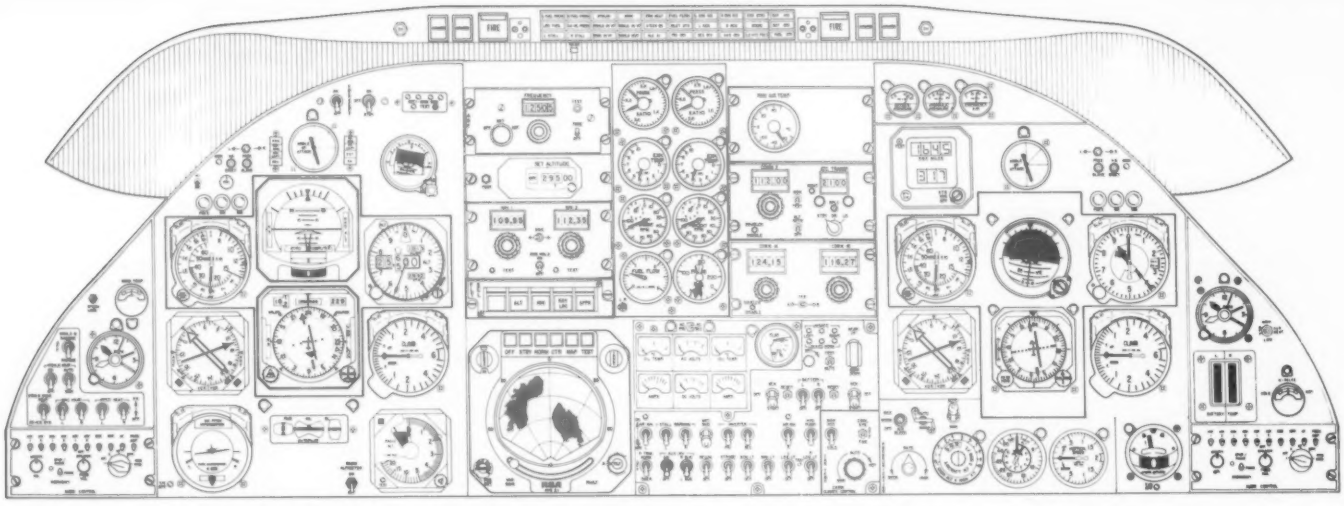
Two hours passed, straight and level. There had been turbulence a few miles back but now everything was going fine, in smooth air. I was flying the airplane by hand, not because the autopilot was inoperative, but because there are times when I like to have the feel of the aircraft in my hands.

I noticed an ever-so-slight indication of altitude loss, so I eased on a little back pressure to correct it. A little later, when I looked again, a slight altitude loss was still showing, so I applied a smidgeon more back pressure. There was a slight loss of airspeed indicated, but only a barely perceptible attitude change on the flight director and emergency auxiliary artificial horizon. But the altimeter needle continued to settle slowly. I thought: 'What's this, I'm still going down?' A cross-check of everything, including the co-pilot's instruments, confirmed the descent. Possibly a downdraft. I reasoned. I couldn't get any physical sensation of a downdraft, but there had been plenty of times when I had been in downdrafts which I couldn't feel. However, those were mostly at lower altitudes either in a storm area or on the lee side of a mountain.

Both altimeters (mine and the co-pilot's) were still unwinding, both vertical speed indicators were showing an increasing rate of descent, and both airspeeds showed a decrease. I added a little power, but we were still going down; more power and a little more back pressure, still descending! The flight director showed a definite nose-up attitude. Unbelievably I was going down even faster, so I applied more power. In the back of my mind I knew there are some situations when a pilot has to sacrifice some altitude *control in order to maintain* attitude *control and continue to fly the aircraft within its structural limitations and away from the stall area, but that situation was becoming alarming.*

I told my co-pilot, "Advise the Center we want to start down."

After all, we were apparently going down anyway. The Center cleared us to 390 (39,000 feet). This would be the normal time to reduce power. In those modern high performance jets you can't simply lower the nose and pick up airspeed on the way down without reducing power because you are already cruising at near red



Cross-checking all the gauges on the Learjet's complex panel ultimately gave Shaffer a clue to the altitude puzzle.

line speed, and the airspeed could pick up like a cannon shot. Any normal descent requires a reduction in power in the clean configuration. But I wasn't in a normal situation, and so I added still more power. The engine gauges then warned me not to add further power or I would exceed limitations. We were still going down.

'Tell the Center we want lower.'

We were cleared to 370 and informed of opposite direction traffic at 350, 12 o'clock, and 18 miles. The way I was falling out of the sky I knew I wasn't going to be able to stop the descent at 370. My co-pilot was keeping the Center informed, and I took a vector away from the approaching traffic. The co-pilot turned on the landing lights when he heard the Center caution about traffic, and that's the mark of a good co-pilot: doing what you want him to do without being told. The traffic said, "No contact," and I couldn't see him, either.

Both airspeeds were showing a further dangerous decay. Lowering the nose slightly produced an almost immediate warning of mach buffet (sonic speed turbulence).

'Attitude and power, altitude and power,' I reminded myself over and over. 'Don't let these get out of hand. Don't reduce power without lowering the nose.'

But how could I lower the nose when six instruments were literally screaming at me to pull up? You know that you may never be able to recover if the aircraft stalls. Some of those T-tailed jets are never stalled, even in testing, because recovery may not be possible no matter how much altitude is available.

I was rapidly crosschecking everything. Airspeed, engine gauges, angle of attack—then something on the cabin pressure panel way over on the co-pilot's side caught my eye because it didn't seem to make any sense. The cabin vertical speed indicator was showing a climb. The pressure differential indicator showed the normal maximum position, but the cabin altitude was higher than normal.

I tried to stay cool, thinking under pressure, reminding myself that I had done it before. What did it signify? Another unbelievable reading? But wasn't the cabin pressure an independent system? Then I thought: try the alternate static system for the altimeter. My co-pilot arrived at the same conclusion at almost precisely the same moment, and he even pointed out the area where the valve was, in case I had forgotten. I knew where it was all right, but I hadn't used it in months. Which way did the blasted thing work? Push . . . pull . . . turn . . . right or left? Break a safety wire and unscrew a knurled knob, or throw a toggle switch after removing a safety strap? There are a lot of different kinds, but it's very difficult to read the instructions in the darkness under the instrument panel.

The co-pilot held the flashlight while I finally turned the lever 90 degrees to the alternate position. The altimeters, which by then were both showing 310, had been unwinding a second ago. Then, almost instantly, the altimeter and vertical climb indicators reversed direction. I was astonished to note the altitude—coming up on 470—47,000 feet!—and climbing. Wow! From 310 to 470 in a matter of seconds. I wondered what the Center's computerized radar data block read-out showed. (On this aircraft the transponder encoding altimeter showed the same reading as the panel altimeter.)

Before I finally began my descent—the real one—I referred to the manual for the alternate static source correction table. I had a nagging fear that I really didn't know how high I was, despite the graph readings. It was black out there and I was descending over unlighted mountainous terrain. When I switched back and forth between normal and alternate static air sources I saw the static instruments go crazy again, so I stayed on alternate. I still had to exercise extreme caution, to keep my altitude accurate on the approach, and I was glad that Pueblo's airport was equipped with a full ILS. That glide slope would be invaluable for checking my altitude when I crossed the outer marker. I planned to start the approach high as a little extra insurance, and if things didn't go right I would do a quick go-around. But things did go right perfectly in fact, and we got down without a scratch on us.

Afterwards the full realization of what had happened began to sink in. I remembered stories I had heard of other pilots who had got into all kinds of trouble after one or more instruments went haywire. I'd always wondered why they didn't just crosscheck everything until they came up with the answer. But here was I, after all I'd been through, wasting valuable seconds trying to puzzle out the problem before I'd completed the crosscheck. Incidentally, we never did find out what had gone wrong with the static pressure. On the ground at Pueblo it checked out perfectly, and when we continued our flight there was no further sign of trouble. Maybe a tiny ice crystal . . . ? Maybe a speck of dust? Maybe an unidentified gremlin? I don't suppose I'll ever know for certain. The one thing I'm sure of is that the experience shook me up enough to make me realize something important: none of us pilots is so calm and cool and collected but that in a moment of intense crisis we are liable to start worrying and stop searching for the answer that may be right under our nose. In my case the answer was a little to the right and below my nose, but it was there all the time."

Editor's note: This pilot's confidence in his training enabled him to solve a critical inflight problem. Readers are invited to contribute to this ongoing series with their own account of a similar type of experience. Articles may be edited slightly with the author's approval.

Current Status of the Federal Aviation Regulations

SUBSCRIPTIONS

Part	Title	Catalog Number	Price Domestic	Price Foreign Handling	Changes Issued
1	Definitions and Abbreviations	TD 4.6:1	$13.00	$3.25	5
21	Certification Procedures for Products and Parts	TD 4.6:21	18.00	4.50	10
23	Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes	TD 4.6:23	12.00	3.00	8
25	Airworthiness Standards: Transport Category Airplanes	TD 4.6:25	22.00	5.50	8
33	Airworthiness Standards: Aircraft Engines	TD 4.6:33	10.00	2.50	3
36	Noise Standards: Aircraft Type and Airworthiness Certification	TD 4.6:36	17.00	4.25	8
37	Technical Standard Order Authorizations	TD 4.6:37	13.00	3.25	6
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91	General Operating and Flight Rules	TD 4.6:91	26.00	6.50	25
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*103	Part Revoked as of 7/1/76				
121	Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft	TD 4.6:121	19.00	4.75	27
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* The regulations for the transportation of hazardous material by air is set forth in Part 175—Carriage by Aircraft, effective July 1, 1976, published in 41 F.R. 16106, 4/15/76. This Part is issued by the Materials Transportation Bureau, Department of Transportation. For information concerning hazardous material regulations, contact the Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590.

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11	General Rule-Making Procedures	SN 050–007–00236–0	$1.30	11–1	SN 050–007–00286–6	.45
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				3	SN 050–007–00340–4	.40
				4	SN 050–007–00390–1	.80
				5	SN 050–007–00413–3	.85
13	Enforcement Procedures	SN 050–007–00230–1	.70	13–1	SN 050–007–00334–0	.40
				2	SN 050–007–00357–9	.40
				3	SN 050–007–00428–1	1.10
27	Airworthiness Standards: Normal Category Rotorcraft	SN 050–007–00244–1	2.10	27–1	SN 050–007–00255–6	.75
				2	SN 050–007–00309–9	.35
				3	SN 050–007–00362–5	1.30
				4	SN 050–007–00370–6	1.40
				5	SN 050–007–00393–5	1.40
				6	SN 050–007–00420–6	2.10
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				2	SN 050–007–00310–2	.35
				3	SN 050–007–00351–0	.40
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				5	SN 050–007–00371–4	1.60
				6	SN 050–007–00394–3	1.40
				7	SN 050–007–00427–3	2.15
31	Airworthiness Standards: Manned Free Balloons	SN 050–007–00246–7	.40	31–1	SN 050–007–00361–7	.65
35	Airworthiness Standards: Propellers	SN 050–007–00247–5	.35	35–1	SN 050–007–00363–3	.65
				2	SN 050–007–00369–2	1.10
39	Airworthiness Directives[2]	SN 050–007–00229–7	.35			
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				2	SN 050–007–00412–5	.85
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				2	SN 050–007–00442–2	.80
49	Recording of Aircraft Titles and Security Documents	SN 050–007–00232–7	.50	49–1	SN 050–007–00336–6	.40
61	Certification: Pilots and Flight Instructors	SN 050–007–00313–7	2.90	61–1	SN 050–007–00353–6	.50
				2	SN 050–007–00372–2	.80
65	Certification: Airmen Other Than Flight Crewmembers	SN 050–007–00314–5	1.25	65–1	SN 050–007–00399–4	.80
67	Medical Standards and Certification	SN 050–007–00248–3	.50	67–1	SN 050–007–00341–2	.40

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73	Special Use Airspace[3]	SN 050–007–00274–2	.40	73–1	SN 050–007–00291–2	.35
				2	SN 050–007–00402–8	.70
75	Establishment of Jet Routes and Area High Routes[3]	SN 050–007–00275–1	.40	75–1	SN 050–007–00326–9	.40
77	Objects Affecting Navigable Airspace	SN 050–007–00276–9	1.10			
95	IFR Altitudes[3]	SN 050–007–00277–7	.50	95–1	SN 050–007–00285–8	.35
97	Standard Instrument Approach Procedures[4]	SN 050–007–00278–5	.45			
99	Security Control of Air Traffic	SN 050–007–00224–6	.70	99–1	SN 050–007–00324–2	.40
101	Moored Balloons, Kites, Unmanned Rockets, and Unmanned Free Balloons	SN 050–007–00223–8	.65	101–1	SN 050–007–00242–4	.50
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107	Airport Security	SN 050–007–00225–4	.40	105–1	SN 050–007–00344–7	.40
				107–1	SN 050–007–00356–1	.40
127	Certification and Operations of Scheduled Air Carriers with Helicopters	SN 050–007–00316–1	1.80	127–1	SN 050–007–00317–0	.35
				2	SN 050–007–00364–1	.65
				3	SN 050–007–00421–4	.75
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				3	SN 050–007–00347–1	.35
				4	SN 050–007–00429–0	.70
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				3	SN 050–007–00389–7	.90
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				2	SN 050–007–00424–9	.75
147	Aviation Maintenance Technician Schools			147–1	SN 050–007–00350–1	.40
	Legal Process and Pleadings	SN 050–007–00250–5	.65			
149	Parachute Lofts	SN 050–007–00221–1	.50			
151	Federal Aid to Airports	SN 050–007–00261–1	1.55			
152	Airport Aid Program	SN 050–007–00323–4	1.35	152–1	SN 050–007–00338–2	.40
				2	SN 050–007–00342–1	.45
				3	SN 050–007–00387–1	.70
				4	SN 050–007–00396–0	.90
				5	SN 050–007–00406–1	.85
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153	Acquisition of U.S. Land for Public Airports	SN 050–007–00262–9	.50			
154	Acquisition of U.S. Land for Public Airports Under the Airport and Airway Act of 1970	SN 050–007–00269–6	.40	154–1	SN 050–007–00388–9	.70
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171	Non-Federal Navigation Facilities	SN 050–007–00281–5	1.10	171–1	SN 050–007–00297–1	.65
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[1] Add 25% for foreign handling.

[2] Due to their length, complexity, and frequency of issuance, individual Airworthiness Directives are published separately in the Federal Register. Copies of Airworthiness Directives that have been issued are for sale in summary form by DOT, FAA Aeronautical Center (consigned agent for Superintendent of Documents), P.O. Box 25461, Oklahoma City, Okla. 73125, Attn: AAC–23.

[3] Due to their length, complexity, and frequency of issuance, individual airspace designations, airways, descriptions, restricted areas, jet route descriptions, and enroute IFR altitudes are not included in the publication of these basic Parts. Such descriptions are published in the Federal Register and depicted on appropriate aeronautical charts. Aeronautical charts can be obtained from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Distribution Division (C–44), National Ocean Survey, Riverdale, Maryland 20840.

[4] Standard instrument approach procedures are published in the Federal Register by reference to FAA documents which are available for examination in the Rules Dockets (AGC–24) and the National Flight Data Center, FAA Headquarters, Washington, D.C., and at the appropriate FAA Regional Offices and Flight Inspection District Offices. These approach procedures can be obtained from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Distribution Division (C–44), National Ocean Survey, Riverdale, Maryland 20804.

THE ENGINE DOCTOR

talks about

Engine Gauges

What Cylinder Head and Exhaust Gas Temperatures Mean to the Pilot

(Editor's note: In our May issue the Doctor explained to an aircraft owner the reasons behind approved methods of adjusting the fuel mixture for economy and power. Today's article is a continuation of that discussion.)

DOCTOR: Well, here you are back again, right on schedule. I believe we were going to talk about cylinder head temperature gauges and—

OWNER: *Doc, you can save your breath to cool your porridge, as my daddy used to say. I already got a CHT, and I feel a lot better. I can fine-tune the mixture without worrying about overheating the engine, just like you said. Saving me a bundle on fuel.*

DOCTOR: That is not quite what I said. The cylinder head temperature gauge is an excellent instrument for helping to safeguard your engine, but for fine-tuning the mixture you would need an EGT.

OWNER: *What is that?*

DOCTOR: The EGT is the exhaust gas temperature gauge. It's an instrument which reads out the temperature of your exhaust gas, by means of a heat-sensing probe in the exhaust stack. Very simple, really.

OWNER: *Why would I want to know about the temperature of my exhaust?*

DOCTOR: Because it is related directly to the combustion temperature. And so is the fuel/air mixtures as we explained before. Leaning the mixture increases combustion temperatures up to peak; enrichening it brings that temperature down. These temperature changes also show up in the exhaust gas.

OWNER: *Are you telling me I went out and bought the wrong gauge?*

DOCTOR: Not at all. The CHT is the primary instrument—if I couldn't afford both a CHT and an EGT gauge on my airplane I'd choose the CHT every time. **Safeguarding the engine is more important than saving fuel.**

OWNER: *Can't I use my CHT to lean right up to peak?*

DOCTOR: Not precisely. Remember, the CHT measures the temperature of the cylinder head—which is a mass of metal—not the combustion inside the cylinder. It takes a little time for any change in the mixture—and the combustion—to register on the CHT gauge. We estimate it takes about five minutes for a new temperature point to stabilize. On the other hand, the EGT gauge, which has a probe right in the exhaust stack, tells you immediately whether the combustion is at peak temperature, or approaching it, or declining. If you move the mixture control knob slowly, the EGT gauge needle will move right along with you. The cruise temperature readings range up to 1700°F. and they are usually calibrated in increments of 25°, so proportionally you have a much closer watch on temperature movement.

OWNER: *If I had one of those, why would I need a CHT gauge?*

DOCTOR: The CHT is the overriding instrument. Whenever it approaches redline, you have to enrich the mixture—regardless of EGT gauge readings—and take other measures as appropriate to reduce cylinder temperature: enrich mixture, open cowl flaps, reduce power, or any combination of these. We like to keep the CHT in the green arc at all times—between approximately 200° and 400°F. If it gets much hotter, you could damage valves or foul the spark plugs. If it get much cooler, you are also apt to foul the plugs—especially with the high lead content in some fuels we use today. Anytime you observe a temperature trend in either direction, without a change in mixture or power setting, you should suspect an engine problem.

OWNER: *Are you saying that the CHT is just for protecting the engine, and the EGT is for accurate leaning?*

DOCTOR: Well no, not exactly. The EGT gauge can be used for fine-tuning the mixture, of course. But it can also give you an early warning of engine trouble, and help you, sometimes, to cope with that trouble in flight. That is especially true if you go to a multi-probe installation, with a heat sensor for each cylinder.

OWNER: *Why? Don't they all run at the same temperature?*

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DOCTOR: Oh, no. Even under normal conditions the cylinder temperatures vary appreciably. In a light, fuel-injection engine like your *Arrow*, they may vary as much as 100°F. just during cruise. With a small, carburetor type engine, that difference could amount to 200°F. One reason is that fuel flow is not precisely equal in these small engines and usually the cylinder getting the least amount of fuel will run hottest.

That, incidentally, is why we see a limited gain from installing a single-probe EGT gauge in these engines—the variance is too great. All we can really do is adjust the mixture for whatever is the hottest cylinder at the time. But with a multi-probe system we can spot trouble in a hurry because we know—from prior calibrations—just about what temperature to expect in each cylinder. The CHT can only tell us about an overall rise, or decline, in engine temperature (unless it too has probes in all cylinders, which is not a common installation). The multi-probe EGT gauge will tell us if the change is in all of the cylinders, or in certain cylinders only. In flight it might even help the pilot determine what adjustments he could make that would enable him to land safely. You look skeptical, but listen to this.

Only last month a young pilot I know had a forced landing that turned out rather badly—and was quite unnecessary. He had flown up to Taos in a single-engine retractable something like yours and was already letting down for the approach when the engine quit on him. Just faded away. He had noticed a decline in CHT just before he reduced power and he suspected carburetor ice. He pulled on the carburetor heat without result; he tried to restart but nothing doing. He attempted to stretch his glide onto the runway but ran out of altitude and had to put it down in an open field. Unfortunately he was too busy to notice the power cable in time, and flipped over. Plane was a total wreck, and the pilot spent an uncomfortable month in the hospital.

In the accident investigation we found dried leaf particles that almost totally obstructed the strainer in the fuel tank he was using. Now with an EGT, the restricted fuel flow would have shown up immediately as a sharp temperature change on the gauge. The early warning would have given him time to consider his problem a little more calmly, and to solve it readily by going to alternate fuel tank selection and setting course for the nearest airport. Pity. Practically a new airplane.

OWNER: *Yeah. But maybe the pilot didn't know that much about engines. We're not all natural-born mechanical geniuses, you know. Maybe the equipment isn't as good as it should be. How did the pilots make out in the old days, when all they had on the panel was a compass and a laundry list?*

DOCTOR: They landed hard and often. Their equipment wasn't as good as what we have now, by any means. In the really old days every pilot was something of a mechanic, and there was a lot of open land you could put down in, clean off the plugs or re-set the timing or whatever, and take off again. Not many places where we can do that anymore, not even in Texas.

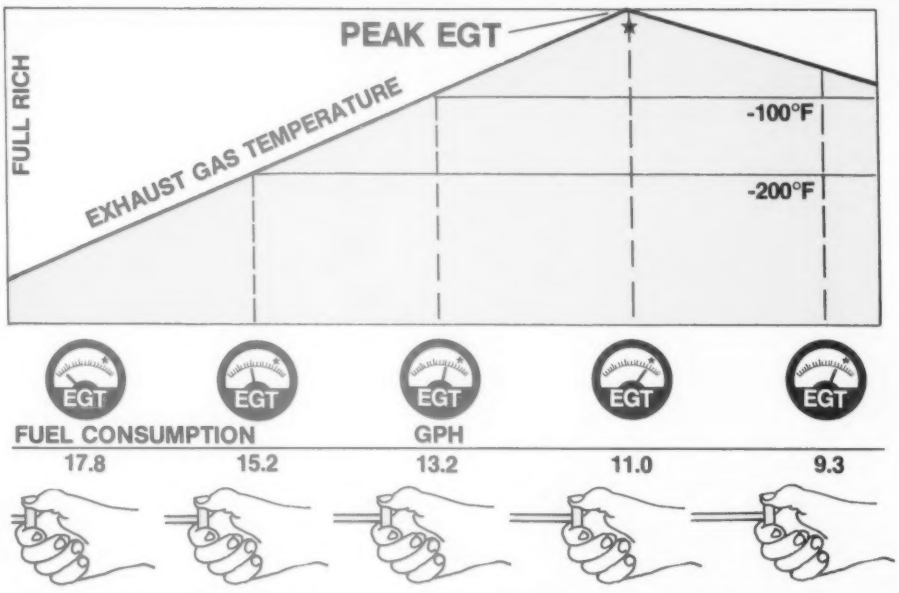


Chart shows the relationship between mixture, fuel consumption and exhaust gas temperature for a 260 hp engine at 10,000 feet. Leaning past "peak" to save fuel is not recommended.

OWNER: *So what's the answer?*

DOCTOR: Keep the airplane flying between airports. Any reasonably priced instrument—and that includes the EGT—that will help me keep the propeller turning over is worth its cost because it makes my flying more relaxed—and safer. Cheaper too, in the long run.

OWNER: *All these gauges may mean something special to a pro like you, but what about us pure and simple pilots. You don't want us doctoring a sick engine up in the sky, do you?*

DOCTOR: Not if you can help it. But any pilot, pure and simple or otherwise, is liable to run into an inflight situation with a faltering engine when he has to make a critical decision about going on, turning back, or landing right away. The safety of all on board will depend upon his decision. The more knowledge you have about what is going on inside the firebox, the better your chances of making a good decision, no matter how rudimentary your knowledge of engines.

The "automatic rough" we often think we hear over open water or high mountains may be imagination, or it may actually be the beginnings of an engine problem. How can you tell? You needn't wait until an engine starts shaking you apart before you decide that something is wrong. Engines are like people: the first measurable sign of trouble is usually an abnormal temperature. If you have an EGT gauge—and especially if you have multi-probe sensors—you may be able to spot trouble coming, upstream so to speak, before the cylinder head temperature moves out of the normal range. An unusual rise of 50°F. on the EGT gauge, with no change in power or mixture, may be worth paying attention to, particularly if it occurs only in one or some of the cylinders. You would want to keep a close eye on those cylinders, and if they continue to heat up you would know you have a real problem.

OWNER: *You mean long before it showed up on the CHT?*

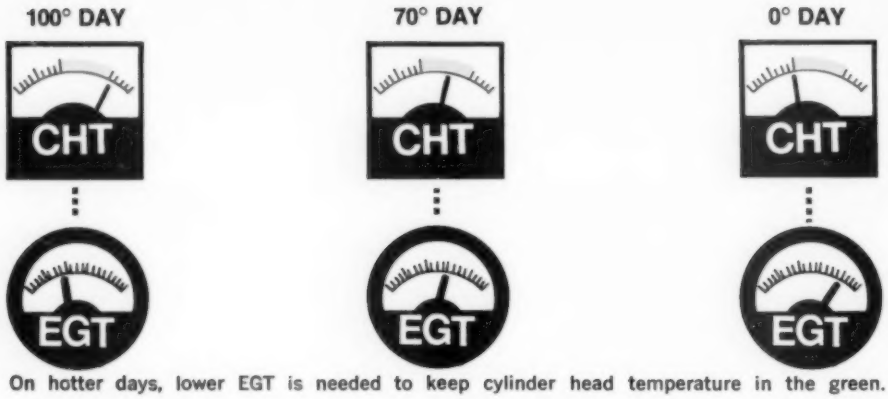
DOCTOR: If it is a slow temperature rise, certainly. A slow rise in one cylinder may take quite some time to register on the CHT, and it won't show at all on the EGT single probe unit if the probe happens to be in the stack of a cylinder that is functioning normally.

OWNER: *So in that case I wouldn't know about the problem until the engine actually started to misfire?*

DOCTOR: Right. And by this time you could be a long way from a landing field.

OWNER: *What about a sudden jump in temperature—doesn't the engine start running really rough right away?*

DOCTOR: It can happen very fast, but with multi-probe EGT you could have some advance warning. Might give you only a few extra seconds before having to shut down and call for help, but over wild terrain or rough waters those few seconds can mean a difference of life or death.



On hotter days, lower EGT is needed to keep cylinder head temperature in the green.

OWNER: *What the gauge is doing for you is buying time, is that right?*

DOCTOR: In some cases, yes, but not always. If the problem is confined to some of the cylinders only, there is nothing you can do in flight but look for a landing field. But if there is a general temperature rise, you can try operating on the left or right magneto only. Enriching the mixture may help lower temperatures, likewise opening cowl flaps or reducing power, even if both mags are in poor shape.

OWNER: *Does the exhaust temperature always go up with engine trouble?*

DOCTOR: Most of the time, but not always. When you see a drop in temperature the situation is rarely critical or beyond in-flight remedy. Carburetor icing, faulty valves or certain ignition problems could produce a drop in combustion and exhaust gas temperatures. For example, if you've just had maintenance done on your ignition system, a temperature decline could mean the ignition is too advanced. Noting whether operating on one mag or the other brings the reading back toward normal, and which cylinders are affected, will save your mechanic a lot of time in diagnosing the problem, once you get back on the ground.

OWNER: *Is that what you meant, a while back, when you said these EGT gauges could save money in the long run?*

DOCTOR: Partly. Any instrument that helps you keep your engine from overheating or overcooling is going to keep down your repair bills. The EGT gauge is especially helpful on descents, when lower power settings and enriched mixtures can easily lead to excessively low combustion temperatures. This is a common cause of spark-plug fouling, and it can be avoided if you watch the gauges on the way down.

OWNER: *Do you recommend one particular brand of EGT gauge?*

DOCTOR: No, that depends on you. There are several that are built in accordance with FAA Technical Standard Orders—TSO'd, as they say. They are basically the same but with certain individual features. Some have absolute temperature readings, and some have only relative indications. Some have a low range for idling, some do not. Some have an aural warning, for overheating, some have warning lights, some have neither. You pay your money and you take your choice.

OWNER: *What happens if the gauge itself is off? How would I know?*

DOCTOR: They are designed to give only an abnormally low reading if they become defective. Check any low reading against your CHT gauge, and rely on the latter.

OWNER: *You mean, for getting out of the airplane?*

DOCTOR: I beg your pardon?

OWNER: *Just my little joke.*

DOCTOR: Uh, yes, I see, Ha. Next patient, please! ■

EGT GUIDELINES

Engine manufacturers' recommendations for the use of exhaust gas temperature gauges are contained in Continental's Service Bulletin M76–19, Rev. 1 (Continental) and the August and December 1977 issues of the Avco (Lycoming) Flyer. This information should be secured from the manufacturer and studied carefully before installing, or operating with an EGT. **Note:** the Aircraft Owner's Manual or the Pilot's Operating Handbook provided by the aircraft manufacturer take precedence over all other recommendations. See handbook or manual for your aircraft.

Takeoff and climb

1. For normally aspirated engines full rich mixture is required except for departure from airports located above 5,000′. For elevated fields *Continental* permits leaning "only to avoid engine roughness or power loss, while still keeping fuel flow within full rich limits." *Lycoming* permits leaning to within 100°F. of peak EGT (on the rich side).
2. Turbo and supercharged engines must be full rich, regardless of field elevation.

Cruise

1. Operation at peak EGT is approved for *Lycoming* normally aspirated engines up to 75% of power; up to 65% if supercharged.
2. *Continental* approves operation at peak EGT only up to 65% of power. At maximum cruise (75% of power) the EGT indicator must be at least 50°F. on the rich side of peak.
3. Turbocharged engines (both manufacturers) are limited to 1,650°F. maximum turbine intake temperature (TIT). The exception is Lycoming's TO-360-C series, with a limit of 1,750°F.
4. Both manufacturers recommend Best Power (maximum indicated airspeed) will be found with an EGT setting between 100°F. to 150°F. on the rich side of peak.

Descent

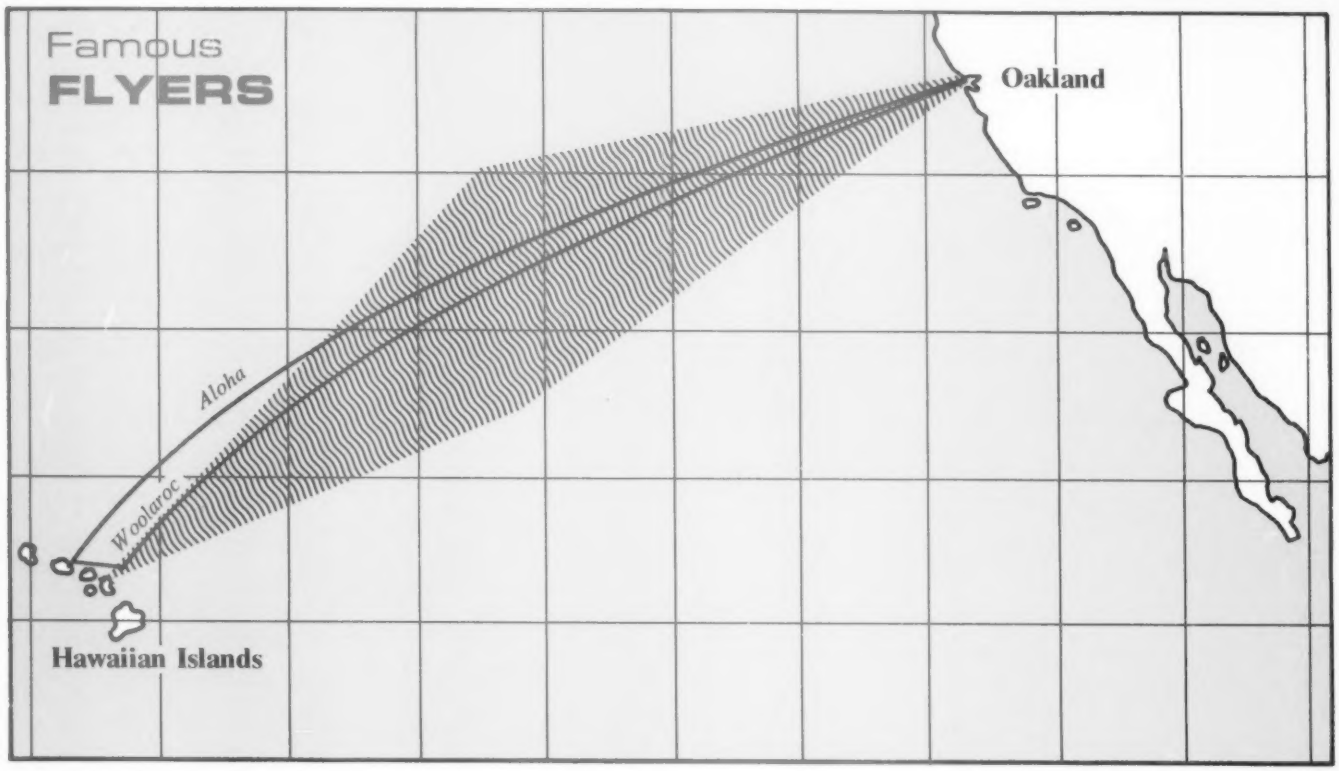
1. At reduced power for normal descent, lean to peak to protect engine against sudden cooling.
2. On reaching pattern altitude, go to full rich for landing at airports below 5,000′ d.a. Lean as required for smooth engine operation at higher airports.

Establishing troubleshooting reference point

1. Establish cruise flight at an altitude where at normal cruise rpm, full throttle will produce maximum power setting approved for peak EGT.
2. Lean mixture to peak EGT, using highest reading cylinder.
3. Set a reference mark. Recheck calibration periodically at the same power and altitude.

Troubleshooting

1. The peak (and the maximum allowable EGT) must be determined anew for any significant change in altitude or power.
2. Any significant variation of EGT without changes in power setting, mixture or altitude should be regarded as a possible indication of engine trouble. Adjust mixture and take other steps as appropriate to correct temperature. (Enrich to cool, lean to increase temperature, unless mixture is already leaned beyond peak.)
3. When unexplained temperature changes occur, determine (equipment permitting) if problem is in all cylinders or not. Note temperature "spread." In general, the more excessive the spread, the more serious the problem.



The Conclusion of the Dole Race

Unreliable navigation led Hawaii-bound airmen to watery grave

An hour after the noon departure from Oakland, Calif., on Tuesday, August 16, 1927, only four of the original 38 entries in the celebrated Dole air race to Hawaii were still airborne. Twenty-seven aircraft had failed to qualify as airworthy for the long overwater trial, four had failed to take off successfully, and three had crashed in preliminary flight; three men were already dead. How far would the four remaining aircraft get? No one had ever ventured so far (over 2,400 miles from a continental shore) over open water in a single engine aircraft.

The leader and favorite to win the $25,000 first prize, the "*Golden Eagle*," had taken off smoothly at 12:31, with John W. Frost at the controls. The "*Eagle*," a cantilever-wing Lockhead monoplane, was the fastest of the remaining contenders, with a top speed of 131 mph. (All the planes were using the same 225 hp Wright Whirlwind engine which had powered Lindbergh to fame, but the "*Golden Eagle*'s" streamlined design and light wood construction gave it the edge in speed.) Backed by George Hearst's *San Francisco Examiner*, the "*Eagle*" was designed to be seaworthy in the event of a water landing, with inflatable interior air bags and detachable landing gear. Additional wheels used to assist in the heavily laden takeoff were jettisoned afterward.

Next in line of flight was the "*Woolaroc*," a big Travelair *Transport* highwing monoplane, with a 50′ wingspan. Given a top-speed rating of 120 mph, the blue and yellow *Transport* cruised at about 100 mph. Extra fuel tanks gave it a capacity of 425 gallons. The navigator was able to shoot the sun with a bubble sextant through his overhead canopy. The airplane carried a total of four compasses and—most significantly—a transmitting radio. The other entrants carried either a small receiver only, or no radio.

The pilot, Arthur C. Goebel, 31, was a well known racer and movie stuntman, a member of the Clover Field (Santa Monica, Calif.) "Black Cats" known for daredevil flying. Ruggedly handsome, he was described by the Press as a "forest ranger" or "Indian warrior" type, and he was clearly the darling of the ladies. But the "Gypsy pilot" took his flying seriously, and engaged a first-class navigator in Navy Lt. W. V. Davis. They planned to navigate a Great Circle course using the radio only for back-up.

Third to head westward over San Francisco's Golden Gate was the sentimental favorite, the "*Aloha*," flown by Marty Jensen, who had recently started a flying service in the Hawaiian Islands. His financial backing came largely from donations raised by his wife Maggie, also a stunt flyer, who wore herself into a near collapse in a whirlwind campaign to raise enough money to purchase a suitable airplane. She was su-

The winner: movie stunt flyer Arthur Goebel and his well-equipped *Travelair*, "Woolaroc"

premely confident that her husband, with his knowledge of the Islands, could win the $25,000 first prize, sorely needed to bolster their shoestring operation—"No more living with cockroaches!" was her battlecry.

Marty Jensen combed the aircraft plants of California for an aircraft he could buy with the meager purse Maggie had raised, but by the first of August he was still unsuccessful and getting desperate. Then in Oakland he heard of a new type of monoplane just being completed for a would-be race entrant who had backed out. He contacted the builder, Vance Breese, pledged the necessary funds (Maggie was still wiring him last-minute contributions), and joined the Breese workmen in a round-the-clock effort to ready the plane in time for takeoff—which had been delayed four days.

Jensen advertised for a navigator and settled on a German-born ship captain, Paul Schluter, after testing his nerve aloft with a series of stunt maneuvers. The completed aircraft looked somewhat like the "*Woolaroc*," but had a smaller wingspan, 41′, a top speed of only 110 mph, and cruised at 84 mph. Fuel capacity was 350 gallons, minimal for the long hop. The "*Aloha*" was painted canary yellow, with a Hawaiian lei on the nose.

The pilot sat in an open cockpit just back of the engine, while the navigator's seat was aft of the wing, under an opening just large enough to permit him to stand up and sight with his sextant. The deafening engine roar made speech unintelligible, so the two men communicated by passing written messages back and forth on a clothes line.

Jensen agreed to fly down close to the sea at sunrise, sunset and noon, to allow his navigator to take a surface sighting—the mariner felt uncertain of his sighting at altitude. This limitation almost brought about a watery demise to their flight on the first day.

After a successful takeoff in clear weather, Jensen decided to conserve fuel by remaining low over the ocean until after the first sighting, planned for sunset. He flew so low in fact that he almost collided with the masts of a freighter before he cleared San Francisco Bay. He continued to fly near the ocean's surface, until sundown.

By this time a fog bank had swirled into the area, completely obscuring the sky. Attempting to climb above it, Jensen was overcome with an attack of vertigo at 4,000′ in solid IFR conditions, and lost control of the aircraft. He recovered in time to level off just over the water. Rather than risk a recurrence of this incident, he continued to fly just over the waves, occasionally striking one with his landing gear. At daybreak clouds again prevented a sighting, and rain squalls were prevalent. After 24 hours of flying, the pilot passed a note forward:

"We should be in sight of the islands."

The reply came back:

"Circle here until midday. I will take a bearing."

"Stay here two and a half hours? How much is left in the main tank?"

"Nothing."

There were only a few inches left, not enough for the engine pump to move the fuel up to the wing tanks. Jensen hand-pumped every drop he could, knowing that their fuel would be running low. The wing tanks held 100 gallons.

At high noon their first and only successful celestial sighting was made, establishing their position as 200 miles north of Oahu.

"Relax, Paul. I know the way from here."

"For God's sake, Marty, don't try any stunts. We'll be lucky to make it."

The fourth plane still in the race, the Buhl *Airsedan*, "*Miss Doran*," had originally taken off ahead of the others, but had returned with a balky engine. After a change of spark plugs the aircraft set out in pursuit of the leaders. Built by Buhl Aircraft of Marysville, Mich., *Miss Doran* was a biplane painted red, white and blue. The wingspan was 42′, the fuel capacity 400 gallons. Pilot John Augie Pedlar and navigator Lt. V. R. Knope (U.S.N.) were accompanied by Miss Mildred Doran, a pert 22 year-old, whose role was limited to inspiration.

On the morning of August 17 the sun rose over a near-deserted Honolulu, as the populace locked up homes, shops and businesses and streamed out to Wheeler Field to be on hand for the air race arrivals. Radio messages from the ships stationed along the route reported several aircraft sightings during the night, but it was not certain which planes had been seen—except for one. The "*Woolaroc*" had been in radio communication with several ships, and was last reported, at 6:00 a.m., as 600 miles out, directly on course and "flying the beacon in" (the low frequency radio course emanating from Oahu and San Francisco).

Not until the blue and yellow *Travelair* came over the field at 2:53 p.m., did Maggie Jensen relinquish her belief that her husband Marty and his *Aloha* would win. A battery of Army guns saluted the victory of the "*Woolaroc*" as it rolled down the runway to a perfect landing—26 hours, 17 minutes and 33 seconds after leaving Oakland. The $25,000 first prize was theirs. The crowd surged around the ebullient Art Goebel and his navigator and carried them off. Then the waiting for the others began.

It was a long, long two hours later before the guns boomed again, this time in honor of the yellow monoplane with the seal of Hawaii standing out, as the "*Aloha*" swooped in from the east. "Marty Jensen, where have you been?" his wife demanded, her face stained with tears of relief and joy. "My God, I've never seen so much water in my life," he said. Second place honors earned them $10,000.

As the afternoon wore to a close with no word of the missing two aircraft, "*Golden Eagle*" and "*Miss Doran*," the crowd drifted away. Early the next morning a rescue effort was launched which became one of the most massive sea searches in peacetime history, involving more than 65 Navy ships and hundreds of maritime vessels, spread over half million square miles. Nothing was found.

The tragic overtones of the race were deepened by the loss of still another plane, the "*Dallas Spirit*," one of the original eight starters which had been forced to return to Oakland with ripped fabric. Spurred by the offer of a $25,000 bonus from Texas backers for the first flight to Hong Kong, and hopeful of finding Dole race survivors en route to Hawaii, pilot Bill Erwin and navigator Alvin

Eichweldt took off in their repaired *Travelair* on August 18. The plane was equipped with a radio transmitter but lacked voice capacity. Attempting to remain close to the surface in order to spot wreckage, the "*Spirit*" encountered dense fog, and apparently the pilot became disoriented after dark. Messages in Morse code described one recovery from a spin and then faded away into silence. The Pacific had swallowed two more airmen and their craft.

What did it all signify? The loss of three of the five planes that attempted to fly the route was attributed by some to bad weather, by others to "race pressure" (i.e. forcing the engines), by still others to navigational errors. The fact that none of those who went down survived, despite the requirements for survival gear, was a stunning blow; the destructive power of the sea would never again be taken lightly by airmen.

For Art Goebel and Marty Jensen, both of whom went on to enjoy lengthy and outstanding careers in aviation, the difference between first and second honors was clearly attributed to the radio. The two and a half hours the "*Aloha*" spent in a holding pattern over the sea, waiting for the noon hour and a celestial sighting, not only cost Jensen first prize but nearly his life as well—considering the almost empty condition of his fuel tanks. And even the "Gypsy pilot" from Clover Field admitted to an anxious moment near the end of the race, when the "*Woolaroc*'s" radio battery went dead and his navigator had to salvage current from flashlight batteries to re-establish contact.

The Dole race to Hawaii had drawn some of the best pilots in the nation, and the drama of men matching their skills and courage against the age-old adversary, the sea, had thrilled the nation—but the sea had been the grim victor.

The one clear lesson that emerged was that aviation would never expand its present horizons until flying could be made more dependable in all types of weather with the aid of avionics. The task was set.

Eight years later regular commercial air service to Hawaii began.

Marty Jensen, right, and navigator Schluter.

BRIEFS

ALASKA BOUND PILOTS from the lower 48 states are urged to contact the Accident Prevention Specialist at their nearest FAA District Office (GADO or FSDO) to obtain copies of free publications on far north flying. "Flying the Alaskan Pipeline" cautions pilots who are considering sightseeing along the pipeline that virtually no services or fuel are available to pilots along the route.

"Flight Tips for Alaskan Tourists" is a comprehensive directory that describes various areas of Alaska normally visited by touring pilots, and includes information of airport, services, weather, etc., in each.

A reprint of two articles that appeared in this magazine last summer, "Flying Over Canada To Alaska," describes the most common routes taken by pilots in flying to Alaska (across Canada or over water), associated hazards, Canadian Air Traffic services and other pertinent data.

ADVICE FOR PARENTS: Children should be seen and not heard—on the airplane radio, that is. A recent incident involving a youngster playing with an airplane radio on an airport ramp caused an Ozark Airlines pilot to delay his landing at St. Louis while he attempted to learn the origin of a radio distress call. The pilot was preparing to land at Lambert St. Louis Airport when he heard what he thought was a woman's confused voice saying she was lost and needed help. He diverted his approach to see if he could help, and briefly sighted a light plane he believed to be the one sending the distress signal. He lost sight of it, however, was unable to find it again, gave up his search and landed. Later it was learned that the "caller" was a boy who had climbed into an airplane on the ramp at nearby Spirit of St. Louis Airport. The child was turned over to his parents with a warning as the fifteen airline passengers went on their way after a 30-minute delay.

WHO-DUN-IT's. Keeping good, precise maintenance records affords the aircraft owner or operator a sure method of holding maintenance personnel responsible for the work they have been asked to do. Accurate entries by mechanics also prevent maintenance personnel from being held responsible for work they DID NOT do. Confusion over what owner/operators have expected and what repair shops have performed has had occasionally serious consequences. A recently updated FAA advisory circular covers the requirements and responsibilities for maintenance records concerning rebuilt engines; altimeter systems; preventive maintenance, etc., as well as suggestions for prospective aircraft purchasers on how to use maintenance records to make a wiser purchase. FAR references are included and there is a suggested format for keeping maintenance logs. Write for "Maintenance Records: General Aviation Aircraft" (AC 43-9A) is free.

Advisory Circulars mentioned in this column, unless otherwise noted, are available free from DOT/FAA Publications Section, TAD-443.1, Washington, D.C. 20590.

Karl Striedieck Wins Transcontinental Sailplane Derby

Karl Striedieck of Pittsburgh was the gold medal winner of the Seventh Annual Smirnoff Transcontinental Sailplane Derby which culminated in Washington, D.C. last month. Second place winner was Wally Scott of Odessa, Texas, followed by Ingo Renner, 1977 winner, and father/son competitors Rudy and Herb Mozer.

The race began in Los Angeles, with stops scheduled at Phoenix, Las Cruces, N.M., Odessa, Tex., Dallas, Oklahoma City, Springfield, Mo., St. Louis, Chicago, Columbus, O., Pittsburgh, Frederick, Md. and Washington, D.C. Poor weather caused delays on the ground in the midwest, and the last two legs had to be scrubbed.

The high-performance sailplanes, which are capable of speeds up to 120 mph, were towed to an altitude of 2,000 feet AGL each day by powered aircraft and released to soar to the next stop. Under ideal conditions these sailplanes have been known to travel as much as 700 miles in a day, although in the contest they flew a maximum of one leg—generally about 250 miles—per day.

Winners were judged on speed, with scoring by elapsed flying time, when the daily goal was reached, or distance flown if it was necessary to land short of the goal airport.

Striedieck picked up an insurmountable lead in his ASW-20 over New Mexico when he soared to nearly 18,000 feet. He holds the world sailplane distance record of 1,015 miles, set last summer along the Appalachian ridges.

Jet-Designer Lear Dies

William P. Lear, maverick industrialist and designer/inventor par excellence, died of leukemia in a Reno hospital on May 14 at age 75. Lear—a high-school dropout who parlayed his "ability to recognize a market and fill it" into world renown and a fortune estimated at $30 million—was best known for development of the Lear Jet, the first successful business turbine-powered aircraft.

Lear held more than 150 other patents (dating back to 1924 when he invented the car radio) including those for the automatic pilot and an aviation direction-finder.

At the time of his death Lear was developing a revolutionary new executive airplane powered by two 800 hp turbine engines to turn a single four-bladed pusher propeller at the rear. He called it the "safest and quietest airplane ever built and one of the most economical."

Top Instructor, Mechanic Honored by G.A. Industry

Obie S. Young, Director of Training for Gulf Coast Aircraft in Pascagoula, Miss., has been named "Flight Instructor of the Year" by an Awards Committee representing all segments of the general aviation industry. A designated pilot examiner as well as instructor, Young was cited for his initiative in designing and writing training aids for airmen. The award, together with various cash and other honorariums, will be presented at a ceremony in Washington, D.C. on June 28.

An industry-representative committee also named Howard Liberski of Ft. Pierce, Fla. as the outstanding mechanic of the year. Liberski, who is employed by St. Lucie Skyways at Stewart, Fla. and also operates Leberski Aero Marine at Ft. Pierce, was cited for his high standard of maintenance and for developing important new test methods.

U.S.-Backed MLS Chosen

At a recent meeting in Montreal, the All-Weather Operations Division of the International Civil Aviation Organization (ICAO) voted to endorse the FAA-backed microwave landing system (MLS) as the world's standard. The American/Australian Time Reference Scanning Beam (TRSB) system was chosen over the competing British doppler system.

The more sophisticated version of MLS offers multiple and curved paths for landing aircraft, which allows more landings to be handled in a given period of time. In its simpler form, the low-cost "small community MLS" will be able to provide instrument landing systems at many general aviation airports not now served by a precision instrument approach.

The recommendations of the Montreal meeting will now be submitted to the Air Navigation Commission of ICAO and subsequently to the ICAO Council for final adoption, probably in late 1978.

Policeman Tickets Aircrew

Pilots who operate at Denver's Stapleton Airport are talking about the overzealous policeman who issued tickets to crews of three airliners at the airport recently, for taxiing without having their flaps down. The officer was following a rule dating back to piston engine days when the flaps-down taxi configuration was used to prevent propellers from blasting passengers on the ramp with air and debris.

In issuing the citations, the policeman boarded the aircraft to personally present the captains with the tickets before the passengers were deplaned. Still another airline crew was cited for deplaning passengers with an engine running.

• ATIS Recordings

I am a low-time private pilot but I am not at all content to blame my lack of experience for the problems I have understanding ATIS tape recordings. Of course some tapes are easier to understand than others, but I feel more emphasis should be placed on enunciation when these tapes are recorded. Also, a voice analysis should be made when selecting those who make the recordings.

Are you aware of this problem? And is anything being done in this area? If not, it should be.

Fred Wikoff, Jr.
Fort Mill, S. C.

FAA is aware of some ATIS problems and is working to correct them. For example, recently a 100-word per minute limit has been placed on broadcast speed in making ATIS tapes. We have an on-going evaluation program, which pilots like yourself can assist by reporting improperly prepared or unreadable ATIS broadcasts. Make comments directly to the responsible tower chief—or one of his staff—by telephone, as soon as possible. Timely constructive criticism can be very helpful in providing an improved ATIS service. The ability to enunciate clearly is a requirement for all tower controllers.

• Seaplane Bases

Would you please tell me where I can find a list of seaplane fuel facilities in the United States?

Dan Barr
Seattle

A complete list of seaplane bases, along with the services (including fuel) available at each, can presently be found in the Airman's Information Manual, Part 2. Note, however, that AIM Parts 2 and 3 are being phased out this year in favor of a seven-volume (geographically organized) Airport/Facility Directory. These publications may be consulted at any FAA Flight Service Station, or you may wish to purchase or subscribe to any or all of the seven volumes of the new Airport/Facility Directory. One-year subscriptions (updated every 56 days) are $10 for the first regional volume; $7.50 for the second, and $5 for each additional region desired. The entire seven-volume set is $37.50 per year. Single copies are $2 per volume.

To order, send check to National Ocean Survey, C-44, Department of Commerce, Riverdale, Md. 20840. Directories will also be available for single-copy over-the-counter sale at certain chart outlets (airports, flight schools, etc.).

• Swiss Cheers

As a reader of your magazine for nine years, I would like to thank you for all the things I have learned from it. I am a private pilot with 600 hours, and FAA GENERAL AVIATION NEWS is, according to my opinion, the most useful of all magazines of this kind.

Prof. J. M. Bochenski
Freiburg, Switzerland

• More on VOR Checks

The FARs require that, before an IFR flight, the VOR receivers must have been "operationally checked within the preceding ten hours of flight time and within ten days before flight . . ." Further, say the FARs, the person making the VOR check shall enter the date, place, bearing error, and signature in the aircraft log or other permanent record. There is, however, no requirement in the FARs that the *tach time* be noted when the VOR check is made. So how is one to determine if the aircraft has exceeded the ten-hour check requirement?

I enjoy your publication and keep several copies available to all in the flight office.

Tom Taylor
Troutdale, Ore.

The rules do not spell out a "tach-time" entry because other methods of timekeeping (clock, Hobbs-meter, etc.) are acceptable. Incidentally, the rules regarding periodic checking of VOR receivers are presently being reviewed by FAA. Watch for some rule changes in this regard in the near future.

• Go-arounds

Speaking of "go-arounds" (as you did in an article in March) I had our *Cherokee* 140 halfway down the final approach slot at our uncontrolled field the other day when dead ahead loomed this bird taking off downwind. So . . . FULL POWER . . . followed by immediate pitch-up, due to low-speed (high angle of attack) trim. Luckily I was not using full flaps, so the go-around was successful, if sloppy.

I believe the basic cause of go-around accidents is power being suddenly applied to an airplane that is trimmed for an approach. The resultant pitch-up precipitates the ensuing stall—particularly if a turn is initiated prior to speed build-up. This all happens before the pilot, in his emergency-confused state, realizes that it's happening or that he MUST keep the nose down, initially.

Certainly the proper execution of the go-around maneuver should be part of the instructor's curriculum. Or maybe it is, since students have a relatively good track record in this area.

Thanks for helping safety by pinpointing causes whenever possible. Incidentally, I had a hard time finding your zip code. Did I miss it in your magazine?

Roger W. Griswold, II
Old Lyme, Conn.

Many instructors agree with your theories on go-arounds and teach "power-and-pitch" as an integrated action to be performed as soon as the need for a go-around is recognized.

Our mailing address, complete with zip code, appears each month on the upper righthand corner of the "Forum" (page 15).

• Flight Test Prerequisites

I would like to suggest that FAA add a section to the Airman's Information Manual, Part One, that would list the endorsements and recommendations needed for an applicant to take a flight test. It would be an immense help to thousands of instructors, flight test applicants and pilot examiners. Far too many flight tests are cancelled or get off on the wrong track due to persons misunderstanding the mandatory paperwork. A consolidation in AIM would minimize the problem.

Donald D. Harrington
W. Chicago, Ill.

We will pass your suggestion on to the Publishing Office for their consideration. Meantime, you and your students will find the small Flight Test Guides that are published for each rating helpful. They contain all the information you mention, and are available from GPO at nominal cost.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-807, Washington, D.C. 20591.

• Flight Into Ice

In your excellent (as usual) January '78 publication, an article on "Light Plane Anti-icing and De-icing Procedures" referred to FAA Regulations which specify that before an aircraft is flown into known icing conditions it must be properly equipped and approved for such flight.

This regulation, however, appears in Part 91 under "Subpart D" which applies to "Large and Turbine-Powered Multi-Engine Airplanes" and I believe it also appears in Part 135. Does that mean that I, as a Part 91 pilot (personal flying) can fly a light single-engine airplane legally into known icing conditions without anti-ice or de-ice equipment?

Michael T. Maiuri
Rochester, N.Y.

Not exactly. The rules are spelled out more specifically for Large Aircraft and Commercial Operations, since the safety of more persons is apt to be at stake. However, pilots who deliberately fly small aircraft into known icing conditions without protective de-icing or anti-ice equipment, thus endangering "life or property of another" could be subject to violation of FAR 91.9 (Careless or Reckless Operation).

• Advisory Circular Requests

In your October 1977 issue you mentioned an FAA Advisory Circular called "Acrobatics —Precision Flying With A Purpose" (AC 91-48) Would you please send me a copy?

Dimitar Kalcheff
Montebello, Calif.

Free FAA Advisory Circulars (such as the one you request) are not distributed by our office, although we do try to keep our readers informed of any new issuances. To receive copies, write DOT/FAA Distribution Unit, M-443.1, Washington, D.C. 20591, mentioning name and number of the circular desired.

INSTRUMENT CORNER

• Position Reports

I was told during a flight check that the only "required" Position Reports for aircraft on IFR flight plans are those found in FAR 91.125. If this is true, what about the others that are found in the Airman's Information Manual, Part 1? Are they not required?

Steve Brown
Denver, Colo.

The only IFR position reports specifically "required" by regulation *are those in FAR 91.125. Included is a requirement for the pilot to report "any other information relating to the safety of flight" (FAR 91.125c).*

"Additional reports" in AIM Part 1 are recommended but not necessarily mandatory. Basically they are any reports that assist controllers in providing a safe and orderly flow of traffic and contribute to the safety of the flight environment.

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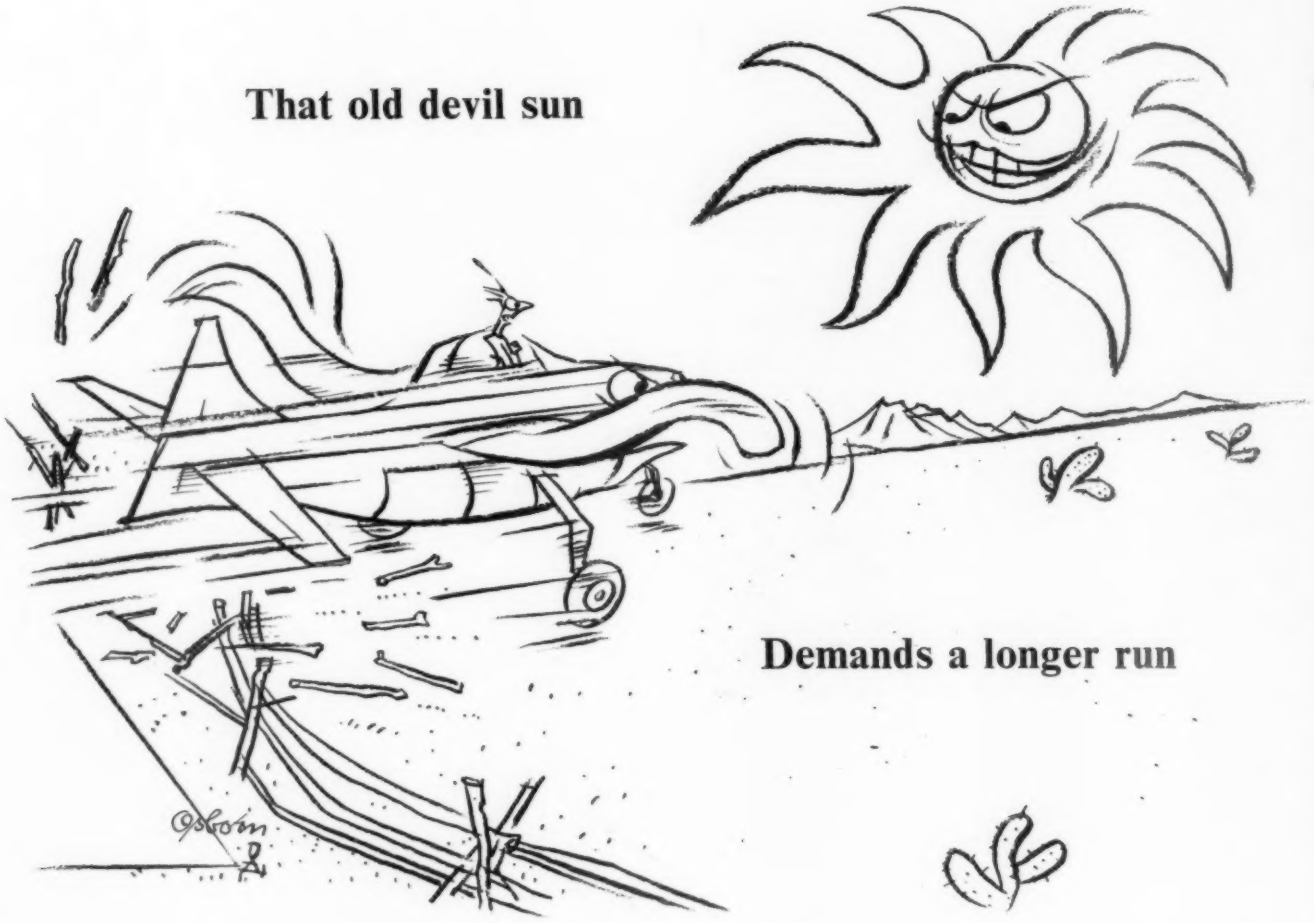
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